Delta Regional Monitoring Program
MERCURY MONITORING
FACT SHEET

The Delta Regional Monitoring Program (Delta RMP) has released a report summarizing findings from the most thorough monitoring to date of methylmercury (MeHg) in fish and water of the Sacramento-San Joaquin Delta. Since 1970, studies have shown that concentrations of MeHg in fish from the Delta exceed thresholds for protection of human and wildlife health. From 2016-2022 the Delta RMP designed and implemented a program of MeHg monitoring with the goals of answering priority management questions and supporting management of MeHg under the Central Valley Regional Water Quality Control Board's Delta Mercury Control Program. The design was cost-effective and succeeded in meeting these goals by generating an extensive and high-quality dataset on MeHg in fish and water. The results of this monitoring have significantly solidified and advanced understanding of MeHg impairment in the Delta and will inform next steps for the Control Program and the Delta RMP.

PHOTOGRAPH COURTESY OF LOREN ELLIOTT

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Background

Concentrations of methylmercury (MeHg) in fish from the Delta have long been known to exceed thresholds that were established by the Delta Methylmercury Total Maximum Daily Load (TMDL) for protection of beneficial uses related to human and wildlife fish consumption. The TMDL was adopted by the Central Valley Regional Water Board in 2010, and approved by USEPA and took effect in 2011. The TMDL included water quality objectives for MeHg in fish tissue and an implementation goal for concentrations of MeHg in water. The TMDL also established a phased Delta Mercury Control Program designed to achieve the MeHg objectives and goals. Sources of MeHg in Delta waters include tributary inputs from upstream watersheds and within-Delta sources such as MeHg flux from wetland and in-channel sediments, municipal and industrial wastewater, agricultural drainage, and urban runoff.

PHOTOGRAPH COURTESY OF WES HEIM

Management Questions

The Delta RMP monitored MeHg in fish and water from 2016-2022 to answer the following core management questions:

MQ1) Is there a problem or are there signs of a problem?

MQ2) Is water quality currently, or trending towards, adversely affecting beneficial uses of the Delta?

MQ3) Are trends similar or different across different subregions of the Delta?

Methylmercury Impairment of the Delta Persists (MQ1 & 2)

The status of methylmercury impairment of beneficial uses in the Delta is generally unchanged from when the TMDL was adopted in 2010. Average concentrations of methylmercury in bass in each subregion exceeded the water quality objective of 0.24 ppm for MeHg in black bass (Figure 1). The Mokelumne River subregion had the highest average concentration (1.41 ppm), almost six times higher than the water quality objective. The Central Delta subregion had the lowest average (0.32 ppm), which was still higher than the water quality objective. Average concentrations of methylmercury in water (data not shown) exceeded the TMDL implementation goal in all of the subregions except one (the West Delta).

Distinct Spatial Variation Continues (MQ3)

The regional spatial patterns of mercury in black bass and water in the Delta that were documented in previous studies and the TMDL continue to persist. Concentrations continued to be higher on the northern, eastern, and southern periphery of the Delta, and lower (but still above the water quality objective) in the Central Delta and West Delta.

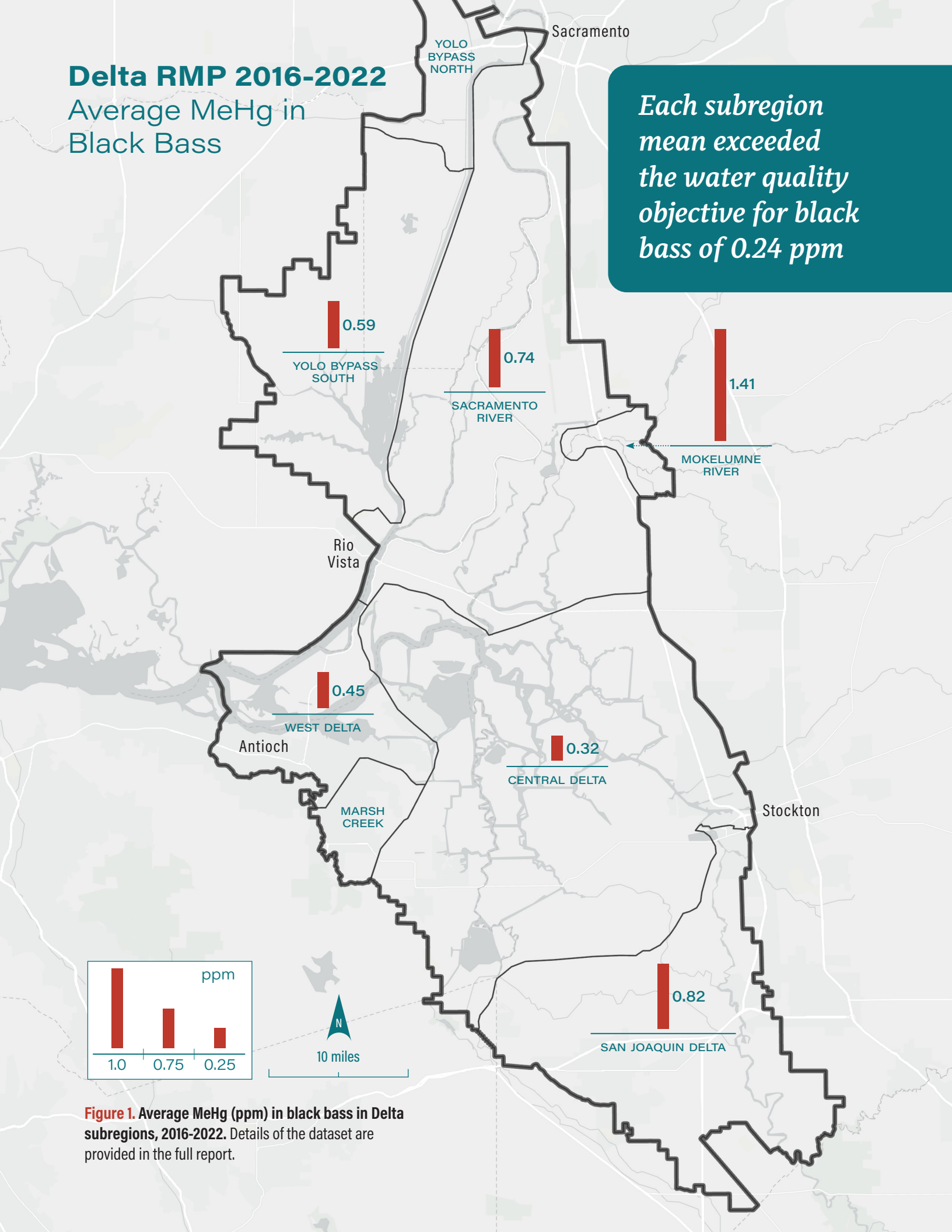
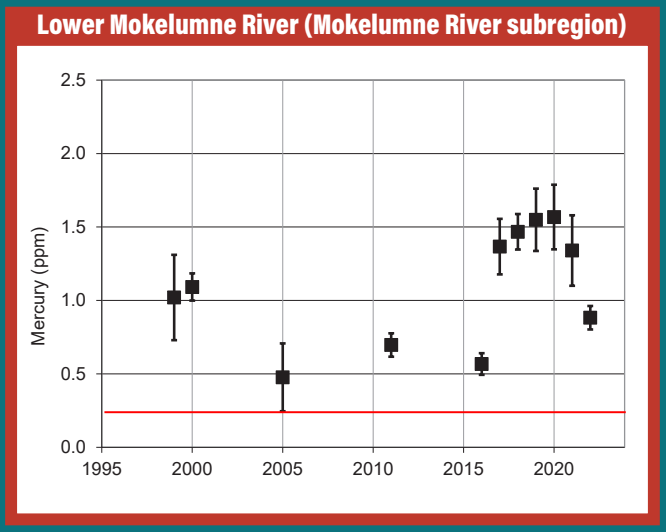
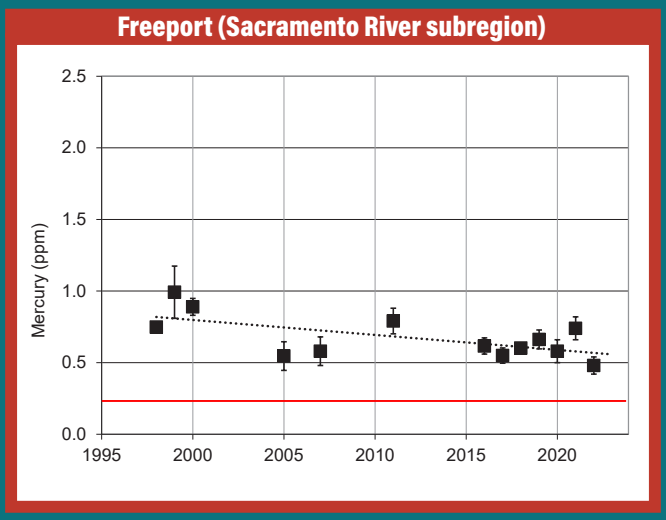
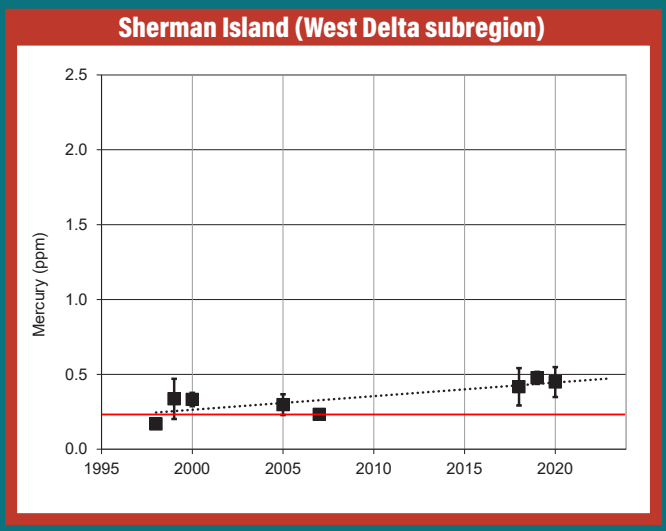


Figure 1. Average MeHg (ppm) in black bass in Delta subregions, 2016-2022. Details of the dataset are provided in the full report.







Long-term trends in annual average MeHg (ppm) in black bass at selected Delta RMP stations. Delta RMP data from 2016-2022, earlier data from other programs. Red lines indicate the 0.24 ppm water quality objective. Error bars show 95% confidence intervals of the annual averages. Dashed lines indicate significant trends. Details of these time series are provided in the full report.

Different Temporal Trends Across Subregions (MQ3)

Annual monitoring of bass and water provided a much clearer understanding of temporal trends. Trends over time were very different among Delta subregions.

Considerable year-to-year variation was observed in two subregions: Lower Mokelumne River (top graph) and San Joaquin River (data not shown). At both of these stations bass mercury concentrations increased in a one-year period from 0.5 ppm to 1.5 ppm, some of the highest levels observed in extensive statewide monitoring. Significant decreases between years were also observed at these stations.

Other stations were less variable between years, but two stations had significant long-term trends: a decrease at Sacramento River at Freeport (middle graph) and an increase at Sherman Island (lower graph).

Drivers of Variation

A possible driver of the high between-year variation in the Mokelumne River and San Joaquin Rivers subregions, supported by prior studies with prey fish in 2005-2007, is between-year variation in streamflow and flooding of upstream wetlands and floodplains in the Mokelumne River and San Joaquin River watersheds. The timing of the Delta RMP mercury sampling effort was fortuitous for evaluating this hypothesis, as it coincided with extreme variation in water year types. Sustained annual monitoring in these areas, along with better information on hydrology and restoration activity, would be critical to understanding the causes of the high concentrations and variation.

Next Steps

Delta RMP mercury monitoring was enlightening and has established a strong foundation for future monitoring and trend assessment. The data generated have been incorporated in the analysis supporting proposed revisions to the Methylmercury TMDL that are currently under consideration. Plans for next steps for Delta RMP methylmercury monitoring are in development.

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Full report information: Davis, J.A., M. Weaver, and W. Heim. 2025. Interpretive Report on Delta RMP Mercury Monitoring: 2016 – 2022. Delta Regional Monitoring Program.
deltarmp.org/Documents/Mercury_Interpretive_Report_2016-2022.pdf